Official

PATENT

A1 continues

59. (New) The system of claim 58, wherein the processor operates on the digital signal by selecting an area of the digital signal from the group consisting of a frequency delimited area and a time delimited area.

60. (New) The system of claim 58, wherein the processor operates on the digital signal by selecting an area of the digital signal from a bit-depth delimited area.

61. (New) The system of claim 58, wherein the encoder ensures that the watermark will survive the changes introduced by the digital filter.

62. (New) A system for pre-processing a watermark message, comprising:

a pre-processor for determining an exact length of a watermark message as it will be encoded; and

a key generator for generating a watermark key that provides at least one unique bit for each bit comprising the watermark message.

63. (New) A system for encoding a watermark in a digital signal, comprising:

a generator for generating a plurality of watermark pseudo-random key bits; and

an encoder for encoding the watermark in the digital signal using the watermark pseudo-random key bits and characteristics of the digital signal.

64. (New) The system of claim 63, wherein the generator is selected from the group consisting of a non-linear generator and a scrambling generator.

65. (New) The system of claim 63, wherein the characteristics of the digital signal comprise mathematically defined functions of the digital signal.

A1 Continues

66. (New) A system for encoding a watermark in a digital signal, comprising:

a mapper for mapping pseudo-random key and processing state information to effect an encode/decode map using a generator; and

an encoder for encoding the watermark in the digital signal using the encode/decode map and characteristics of the digital signal.

67. (New) The system of claim 66, wherein the generator is selected from the group consisting of a non-linear generator and a scrambling generator.

68. (New) The system of claim 66, wherein the characteristics of the digital signal comprise mathematically defined functions of the digital signal.

69. (New) A system for encoding watermarks, comprising:

an inverter for inverting at least one instance of the watermark bit stream; and

an encoder for encoding at least one instance of the watermark using the inverted instance of the watermark bit stream.

70. (New) A system for analyzing composite digitized signals for watermarks, comprising:

a first receiver for receiving a composite signal;

a second receiver for receiving an unwatermarked sample signal;

an aligner for time aligning the unwatermarked sample signal with the composite signal;

an adjuster for gain adjusting the time aligned unwatermarked sample signal to a corresponding segment of the composite signal, determined when the signals are time aligned;

an estimator for estimating a pre-composite signal using the composite signal and the gain adjusted unwatermarked sample signal;

A1 Continues

an estimator for estimating a watermarked sample signal by subtracting the estimated pre-composite signal from the composite signal; and

a scanner for scanning the estimated watermarked sample signal for watermarks.

71. (New) A method for pre-analyzing a digital signal for encoding a plurality of digital watermarks using a digital filter, comprising:

providing a digital signal;

providing a plurality of digital watermarks;

determining an encoding level; and

encoding each of the plurality of digital watermarks in the digital signal at substantially the same encoding level.

72. (New) A method for pre-analyzing a digital signal for encoding digital watermarks using a digital filter, comprising:

providing a digital signal;

providing a digital filter to be applied to the digital signal; and

identifying an area of the digital signal that will be affected by the digital filter based on at least one measurable difference between the digital signal and a counterpart of the digital signal selected from the group consisting of the digital signal as transmitted, the digital signal as stored in a medium, and the digital signal as played backed.

73. (New) A method for encoding a watermark in a content signal, comprising:

splitting a watermark bit stream, and

encoding at least half of the watermark bit stream in the content signal using offsetting instances of the watermark bit stream.

74. (New) A method for encoding at least one watermark in a content signal, comprising:

predetermining a number of bits in the content signal to be encoded, based on at least one

A1 continued

of a fixed length key and signal characteristics of the content signal; and

encoding the watermark in the predetermined bits.

75. (New) A method for encoding at least one watermark in a content signal, comprising:

locating at least one noise-like signal feature in the content signal; and

encoding the at least one watermark in substantially the same location as the at least one noise-like signal feature.

76. (New) A method for encoding at least one digital watermark in a content signal comprising:

measuring a perceived signal-to error ratio; and

encoding the at least one watermark in a channel bound by a minimum and maximum signal-to-error level for the content signal.

77. (New) A method for digital watermark encode/decode comprising the steps of:

measuring a perceived signal-to error ratio; and

encoding at least one watermark in a signal feature that is bound by a minimum and maximum signal-to-error level for the digital signal.

78. (New) A method for digital watermark decode comprising:

receiving a suspect digital signal to be analyzed;

subjecting the digital signal to a time-based alignment; using the time-based alignment to align amplitude values in the suspect digital signal; and

decoding a digital watermark.

79. (New) A method for encoding watermarks in a digital content signal, comprising:

identifying a plurality of signal features in the digital content signal; and

A1 Continues

inserting watermark data in the identified signal features; wherein the identified signal features are identified from relationships between multiple sample windows in the digital content signal.

80. (New) The method of claim 79, wherein the signal features have logical relationships with an analog waveform represented by the digital content signal.

81. (New) The method of claim 79, wherein the signal features comprise mathematical functions of the sample windows.

82. (New) A method for decoding watermarks from a digital content signal, comprising:

identifying a plurality of signal features in the digital content signal; and

decoding watermark data from the signal features;

wherein the signal features are identified from relationships between multiple sample windows in the digital content signal.

83. (New) The method of claim 82, wherein the signal features have logical relationships with an analog waveform represented by the digital content signal.

84. (New) The method of claim 82, wherein the signal features comprise mathematical functions of the sample windows.

85. (New) A method for pre-analyzing a digital signal for encoding digital watermarks using a digital filter comprising:

identifying at least one of a frequency and a time delimited area of the digital signal that will be affected by the digital filter; and

encoding at least one digital watermark so as to avoid the identified area.

86. (New) A method for pre-analyzing a digital signal for encoding digital watermarks using a digital filter, comprising:

A1 Continued

identifying at least one change to the digital signal that will be affected by the digital filter; and

encoding at least one digital watermark so the watermark survives the changes introduced by the digital filter.

87. (New) A method for guaranteeing watermark uniqueness, comprising: providing a watermark; and attaching a timestamp.

88. (New) A method for guaranteeing watermark uniqueness, comprising: providing a watermark; and attaching a user identification dependent hash to the watermark.

89. (New) A method for guaranteeing watermark uniqueness, comprising:

providing a watermark; and

attaching a message digest of watermark data.

90. (New) A system for digital watermark encode/decode operations, comprising:

a parameter database comprising a plurality of parameters; and

a processor which encodes at least one watermark using at least one parameter from the parameter database.

91. (New) A method for digital watermark encode/decode comprising:

providing a digital signal stream; using one or more of a plurality of watermarking parameters to encode at least one digital watermark; and

associating the one or more of a plurality of watermarking parameters with a predetermined key.

92. (New) An article of manufacture comprising:

a receiver to receive a digital signal;

a detector to detect at least two of a plurality of digital watermarks located within the digital signal; and

A1 Continued

a processor that enables content signal manipulation of the digital signal based on successful detection of at least two of the plurality of digital watermarks.

93. (New) The article of claim 92, wherein the detector also detects a watermark, further comprising: a verification module which verifies at least one detected watermark.

94. (New) A method for pre-processing a digital data signal to authorize a plurality of unique descendant copies of the digital data signal, comprising:

providing the digital data signal;

identifying a plurality of candidate bits in the digital data signal that can be manipulated during embedding;

generating a digital watermark message to be embedded based on at least one predetermined criterion; and

embedding the digital watermark message in the plurality of candidate bits.

95. (New) The method of claim 94, wherein the step of identifying candidate bits of the digital data signal to be manipulated comprises:

generating a psychoacoustic model of the digital data signal.

96. (New) The method of claim 94, wherein the step of identifying candidate bits of the digital data signal to be manipulated comprises:

generating a psychovisual model of the digital data signal.

97. (New) The method of claim 94, wherein the digital data signal comprises compressed digital data.

98. (New) The method of claim 94, wherein the step of generating a digital watermark message comprises:

generating a unique digital watermark message for each authorized descendant copy.

A1 Continued

99. (New) The method of claim 94, wherein the criterion are selected from the group consisting of a transaction identification, an individual identification, a use limitation, and a signal domain.

100. (New) The method of claim 94, wherein the digital watermark message is encoded in a subset of the plurality of candidate bits identified.

101. (New) The method of claim 94, wherein the plurality of candidate bits that are embedded with the digital watermark message have a relationship that creates additional uniqueness of the digital watermark message.

102. (New) The method of claim 101, wherein the relationship is at least one of a sequential relationship, a linear relationship, and a logically-ordered relationship.

103. (New) The method of claim 94, wherein a subset of the plurality of the candidate bits share at least one function.

104. (New) The method of claim 103, wherein the function is selected from the group consisting of mapping, error correction, and signal processing.

105. (New) The method of claim 94 further comprising:

selectively adding noise to the digital data signal.

106. (New) A method for pre-processing a digital data signal to steganographically encode unique copies of the digital data signal, comprising:

providing a digital data signal; identifying candidate bits of the digital data signal that will be steganographically encoded;

A1 Continued

generating a key on at least one predetermined criterion; and

manipulating the digital data signal at the plurality of candidate bits with the key.

107. (New) The method of claim 106, wherein the step of identifying candidate bits of the digital data signal to be manipulated comprises:

generating a psychoacoustic model of the digital data signal.

108. (New) The method of claim 106, wherein the step of identifying candidate bits of the digital data signal to be manipulated comprises:

generating a psychovisual model of the digital data signal.

109. (New) The method of claim 106, wherein the step of providing a digital data signal comprises providing a digital data signal comprised of compressed digital data.

110. (New) The method of claim 106, wherein the step of generating a scrambling key comprises:

generating a unique scrambling key for each authorized copy.

111. (New) The method of claim 106, wherein the criterion are selected from the group consisting of a transaction identification, an individual identification, a use limitation, and a signal domain.

112. (New) The method of claim 106, wherein a subset of the plurality of candidate bits identified are manipulated with the key.

113. (New) The method of claim 106, wherein the step of manipulating the digital data signal at the plurality of candidate bits with the scrambling key comprises: manipulating the plurality of candidate bits with a key to embed a watermark and to add noise to digital signal.

A1 Continued

114. (New) The method of claim 113, wherein the relationship is at least one of a sequential relationship, a linear relationship, and a logically-ordered relationship.

115. (New) The method of claim 106, wherein a subset of the plurality of the candidate bits are selected based upon their ability to survive a predetermined test of robustness.

116. (New) The method of claim 115, wherein the function is selected from the group consisting of mapping, error correction, and signal processing.

117. (New) A method for creating a copy of a digital data signal, comprising:

obtaining a model for the digital data signal; and

generating a watermark for the descendant copy of the digital data signal based on at least one criterion.

118. (New) The method of claim 117, wherein the step of obtaining a model of the digital data signal comprises:

generating the psychoacoustic model for the digital data signal.

119. (New) The method of claim 117, wherein the step of obtaining a model of the digital data signal comprises:

retrieving a stored psychoacoustic model for the digital data signal.

120. (New) The method of claim 117, wherein the step of obtaining a model of the digital data signal comprises:

generating the psychovisual model for the digital data signal.

A! Continues

121. (New) The method of claim 117, wherein the step of obtaining a model of the digital data signal comprises:

retrieving a stored psychovisual model for the digital data signal.

122. (New) The method of claim 117, wherein the criterion are selected from the group consisting of a transaction identification, an individual identification, a use limitation, and a signal domain.

123. (New) A method for pre-processing a digital data signal, comprising:

providing a digital signal;

identifying a plurality of candidate bits in the digital data signal that can be manipulated during embedding;

generating at least one digital watermark message to be embedded based on at least one predetermined criterion;

selecting candidate bits to manipulate; and

embedding the at least one digital watermark message in the selected candidate bits.

124. (New) The method of claim 123, wherein the at least one predetermined criterion includes at least one characteristic of the digital signal.

125. (New) The method of claim 123, wherein the step of selecting candidate bits to manipulate comprises:

selecting candidate bits that provide optimal locations for the digital watermark.

126. (New) The method of claim 123, further comprising the step of:

inverting at least one watermark out of a plurality of embedded watermarks.

127. (New) The method of claim 123, further comprising the step of:

decoding the at least one digital watermark from the digital data signal.

Continued

128. (New) The method of claim 127, wherein the step of decoding the at least one digital watermark from the digital data signal comprises:

degrading the watermarked digital data signal responsive to an unauthorized attempt to decode the digital watermark form the digital data signal.

129. (New) The method of claim 127, wherein the step of decoding the at least one digital watermark from the digital data signal comprises: degrading the watermarked digital signal responsive to fewer than all embedded watermarks being decoded from the digital signal.

130. (New) The method of claim 127, wherein the step of decoding the at least one digital watermark from the digital data signal is asymmetric.

131. (New) The method of claim 123, wherein a key corresponding each of the at least one watermark comprises a greater number of bits than the corresponding watermark message.

132. (New) The method of claim 123, wherein a key corresponding each of the at least one watermark comprises the same greater number of bits as the corresponding watermark message.

133. (New) A method for pre-processing a digital data signal to authorize a plurality of unique descendant copies of the digital data signal, comprising:

providing a digital data signal; identifying candidate bits of the digital data signal that will be manipulated during scrambling;

generating a key on at least one predetermined criterion; and

manipulating the digital data signal at the plurality of candidate bits with the scrambling key.